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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/724,133	12/01/2003	Joon Hyeon Lee	P69337US0	1214

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EXAMINER

DEO, DUY VU NGUYEN

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 07/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)	
	10/724,133	LEE, JOON HYEON	
	Examiner	Art Unit	
	DuyVu n. Deo	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 01 December 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |                                                                                                                                              |                                                                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                                                  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                                         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>12/1/03</u> . | 6) <input type="checkbox"/> Other: _____                                                |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 7-9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 7-9 recites the limitations of etching the BARC and the insulating film. It is unclear how these etching steps relate to the method of claims 1 and 6. It is unclear if these etching steps relate to the limitation of "etching the insulating film in an isotropic manner" in claim 1 or they are different etching steps.

***Drawings***

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: page 6, line 23, the "metal polymers 230" is not found in figure 2D. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required

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corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 4, 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Liu et al. (US 6,117,345).

Liu teaches a method for forming wiring lines comprising: depositing a metal layer 24 on a semiconductor structure (col., line 50-64); forming an insulating layer 28 and a photoresist on the metal layer (col. 4, line 30-40); etching the metal line by using the photoresist and the insulating layer as a mask (col. 7, line 37-48); removing the photoresist and isotropically etching the insulating (col. 8, line 55; col. 9, line 40-44).

Referring to claims 4 and 5, the insulating layer includes nitride and oxide (claimed top layer in the semiconductor structure).

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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7. Claims 2, 3, 6, 7, 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu as applied to claim 1 above, and further in view of Gutsche et al. (US 6,117,353).

Referring to claims 2 and 3, Liu doesn't describe the metal layer includes TiN below and above the Al, and a BARC between the photoresist and the insulating layer. This structure is typical and known to one skilled in the art as shown here by Gutsche (col. 1, line 25-45; col. 5, line 33-50). It would have been obvious for one skilled in the art to modify Liu in light of Gutsche's teaching in order to form a structure for forming a metal lines as taught by Gutsche (col. 1, line 5-19) with a reasonable expectation of success.

Referring to claim 7, Gutsche further teaches etching through the hard mask, which would includes etching the BARC and the insulating layer, using a mixture of CF<sub>4</sub>, CHF<sub>3</sub>, and Ar.

Referring to claim 11, Gutsche further teaches of cleaning the substrate after the etching process (col. 6, line 40-45).

8. Claim 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu and Gutsche as applied to claim 6 above, and further in view of Fujiwara et al. (US 6,232,209).

Referring to claim 8, above applied prior art doesn't describe etching the BARC and the insulating layer in a single etch step using gas mixture including CxFy, O<sub>2</sub>, and Ar. Fujiwara teaches an etching mixture for antireflective layer and the insulating layer including CF<sub>4</sub>, O<sub>2</sub>, and Ar (col. 11, line 41-55). It would have been obvious for one skilled in the art to etch the two layer in light of Fujiwara because he teaches another mixture that is known to one skilled in the art at the time of the invention to etch the two layer where the photoresist can be removed at the same time (col. 11, line 55-65) with a reasonable expectation of success.

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9. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liu, Gutsche, and Fujiwara as applied to claim 6 above, and further in view of Keil et al. (US 2002/0173160).

Referring to claim 9, Fujiwara further etching the antireflective and the insulating layer separately (col. 14, line 55-65). Unlike claimed invention, Fujiwara doesn't describe etching the antireflective using gas including N<sub>2</sub>. Keil teaches a mixture for etching antireflective including O<sub>2</sub>, N<sub>2</sub>, and Ar (claim 1; paragraph [0006]). It would have been obvious for one skilled in the art to etch the antireflective in light of Keil, when etching separately, since Keil teaches that the gas mixture would etch the antireflective layer selectively to the photoresist and the insulating layer (paragraph [0006]).

10. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liu as applied to claim 1 above, and further in view of Lin et al. (US 6,063,695).

Referring to claim 10, Liu is silent about the gas mixture for isotropic etching of the insulating layer; however, isotropic etching using O<sub>2</sub>/CF<sub>4</sub> for the insulating layer is well known to one skilled in the art as shown here by Lin (col. 5, line 35-45) (claimed down flow method). It would have been obvious for one skilled in the art to isotropically etch the insulating layer in light of Lin's teaching because Lin further describes the method and gas that is silent by Liu for the etching of the of the insulating layer with a reasonable expectation of success.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n. Deo whose telephone number is 571-272-1462. The examiner can normally be reached on 6:00-2:30 Mon-Fri.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Primary Examiner

Duy-Vu N. Deo

7/18/05

